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FRIDAY, JULY 15, 1921

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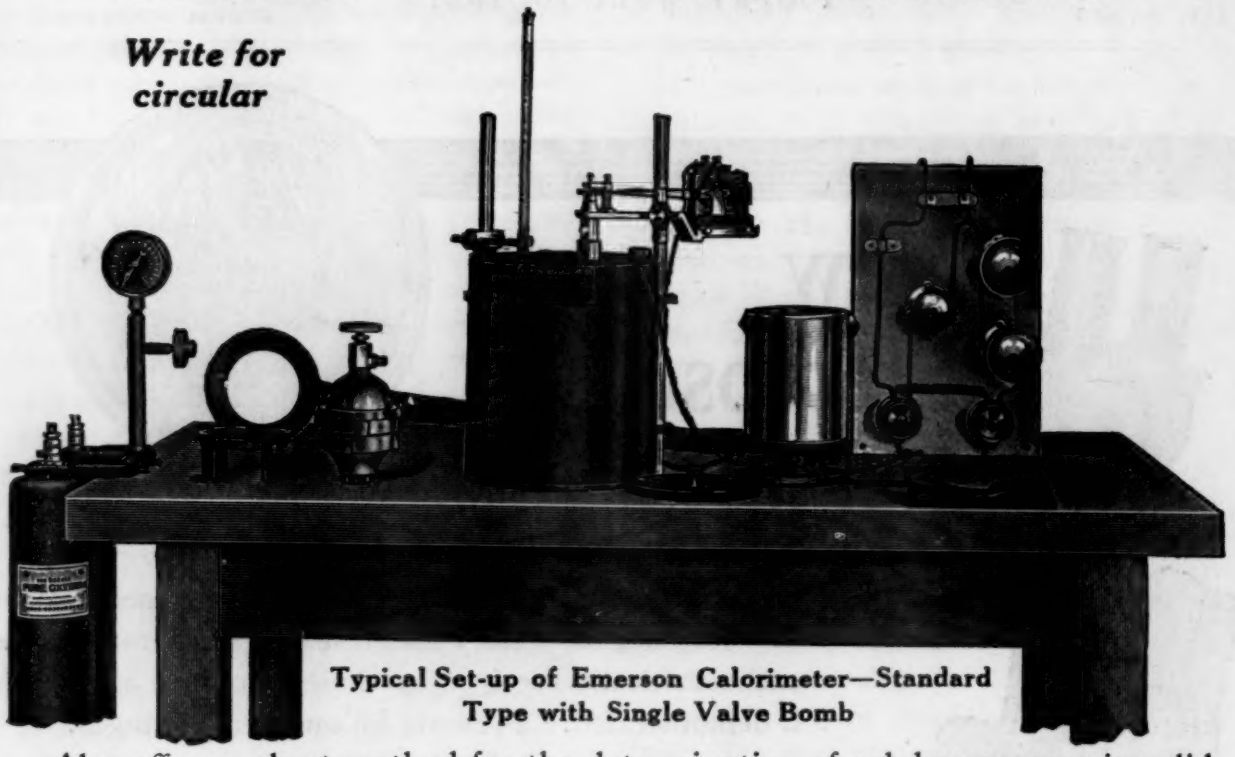

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SCIENCE

FRIDAY, JULY 15, 1921

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MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

THE RESPONSIBILITY OF THE BIOLOGIST IN THE MATTER OF PRESERVING NATURAL CONDITIONS

THE writer has accepted a joint chairmanship of the Committee on the Preservation of Natural Conditions of the Ecological Society of America. The special task undertaken by him is to interest some of our leading scientific organizations and institutions in a proposed affiliation for the purpose of making "a more serious effort to rescue a few fragments of vanishing nature."

I am only too painfully aware of the fact that this task might have been undertaken by others with much more promise of success. There are many in the ranks of American biologists whose scientific prestige and administrative ability would carry far greater weight than mine. There are many who could—if they would—undertake this plain duty without risk to their health and without serious curtailment of their output in the field of research. It is my hope that more of our leaders in science will be aroused to the necessity of becoming also leaders in the conservation movement. I for one will welcome the day when this leadership will pass into their hands. In the meantime, I shall be glad, if only in a slight degree, to play the rôle of an enzyme or catalyzer, which may provoke effective energy transformations in others.

That both our native fauna and flora and our natural scenery are disappearing at an appalling rate is obvious to all, except those whose interests and outlook are bounded by the walls of their laboratories. Despite the indignant denials of some, I am afraid that this last type of individual is not wholly mythical. But the great bulk of the apathy with which we have to contend is doubtless due to another cause. This is a spirit of

fatalism—the sullen acceptance of a situation which is regarded as inevitable. What can a few dreamers do to stem the tide of such powerful biological and social forces as the prevailing spirit of commercialism, the concentration of present-day mankind in cities, with a resulting dominance of the urban viewpoint, and particularly the resistless pressure of increasing population everywhere?

Whether in the future these calamitous tendencies will be voluntarily checked by the intelligent concerted action of mankind, or whether they will be checked automatically by some world-wide catastrophe, need not concern us here. Ultimately some endurable balance will be struck between the human population of our globe and the available amount of food, space and other conditions essential to life. For all we know, this unbridled growth of population *may* be halted before the world is utterly congested, and while there are still large areas in a more or less primitive condition. Does not this last supposition contain enough of probability to warrant its acceptance as a guiding principle of action? Is it not worth while to reserve from settlement and exploitation extensive tracts of the earth's surface, representing at least the most interesting types of fauna and flora and physiography?

We have made a brave beginning in this direction, with our national and state parks, our national forests, national monuments, game refuges and the like, though it must be confessed that these reservations are still continually threatened by predaceous interests and that their permanence is not in the least assured.[1] But we should carry these efforts vastly further. The areas chosen should be more numerous and more diversified. A greater variety of motives should be given scope in achieving these ends. Economic considerations, such as the conservation of lumber and water-power, should still be recognized as immensely important, as should also the need for public recreation grounds. But purely scientific considerations should likewise be accepted as legitimate reasons for reserving tracts from settlement or molestation.

Work of fundamental importance regarding the phenomena of heredity has been done in our laboratories, experimental gardens and breeding-pens, and much of this work bears more or less directly upon the problems of organic evolution. But there are many of us who feel that these problems can not be solved without a very intensive study of the products of evolution in nature. To try to arrive at an explanation of the "origin of species" without an adequate analysis of the phenomena of geographic variation, and the interrelationships of our species and subspecies in the wild, seems to some of us utterly bizarre.

So far, so good, but what can we do about it? This is naturally the hardest question of all to answer. To seek advice on this subject is my main excuse for writing this article. Let me say before going further that I do not make the absurd claim that I or my colleagues on this committee are solitary voices crying in the wilderness. Many and powerful are the influences already enlisted in support of one or another movement toward the protection of wild life and of natural scenery. And the concrete results, in terms of actual achievement, would require scores of pages even to outline. Many of these results have become incorporated into our laws and our machinery of government.

It is my purpose here to point out two fundamental needs: (1) the need of some one or more national organizations whose duty it shall be to coordinate all these activities and impulses, and (2) the need that our scientific men, and particularly our biologists, shall play a far greater part in this movement than they have ever done in the past. I shall speak of this second point first.

Biologists, above all others, should be in a position to appreciate the loss to science which results from the destruction either of single natural species or of natural associations of species. They are in a unique position to give advice as to what particular species and

[1] Witness the present federal water-power act (now happily amended), and the recent attempts to raid the Yellowstone.

associations are of greatest importance to science, and as to which ones are in most urgent need of protection. It is likely, too, that many of our number are in a position to suggest the most promising methods of protection. At least, no others are probably so well qualified to do so.

Most of all, perhaps, the influence of the biologist is needed in counteracting the dominant utilitarian or materialistic trend of the day. He should be on hand to register his insistence upon the recognition of claims that are not expressible directly or remotely, in dollars and cents, or in the merely quantitative expansion of our civilization. If he camouflages his true feelings by talking in the current language of the market-place, he is, to that extent, a traitor to our cause. The conservation of our material resources can be depended upon to take care of itself—in the future, if not in the past. Some of the great commercial interests themselves are beginning to insist that a sane policy be adopted in these matters. But the cause of science—genuine science—in the public mind, is still very weak, and needs every ounce of energy which can be thrown into its support. How, let us again ask, can this energy be most effectively brought to bear at the present time? This is, in a large degree, a question which I am asking my readers, rather than attempting to answer here.

Unlike, as I believe, the case of researches which are directed toward the discovery of general principles, a practical project like the one in hand can only be accomplished by the aid of a high degree of organization. What form this organization will ultimately take, in the present instance, is hard to forecast. It is my belief that sooner or later its administration must be in the hands of men who are willing and able to make this their life work. Such men will probably be hard to find. The university biologist, however gifted otherwise, is commonly neither willing nor able to achieve success along these lines. On the other hand, a mere high-grade clerk, the counterpart of some of our bureau or division chiefs in the government service, would probably make an even more lamentable failure. A broadly trained field naturalist, with a more than usual endowment of public spirit and administrative talent, would doubtless fill the bill. His salary should be commensurate with his great responsibilities. He should have a staff of expert assistants, giving much of their time to first-hand observations of the unequal struggle between man and nature, and to actual surveys of proposed reservations. Furthermore, this important official should have an adequate office force. These are minimum requirements.

Who would foot the bill? I don't know. I have never had anything to do with raising funds for major enterprises. In reply, however, I will ask another question: Is not the preservation of large fractions of our fauna and flora and landscape, in their natural condition, a project calculated to stir the imagination of money-givers of the sort that have endowed various other enterprises for the welfare of mankind?

The actual administration of any tracts of land, set aside as natural preserves, would doubtless devolve upon the national or the state governments. The cost of purchasing this land might be met either by private donations or by government or state appropriations. But the cost of conducting such preliminary surveys as I have suggested, together with the necessary nation-wide educational campaign, would doubtless have to be defrayed out of funds from purely private sources. And these funds would need to be large.

I have deferred to the last the specific proposals which I have to make. The type of organization which I have outlined above is not yet in existence. So far as I know, neither the men nor the funds are in sight at present. Furthermore, should any such central bureau or clearing-house for conservation activities be established, it would have to work, in a large degree, through the various existing organizations. Prominent among these, at the present time, is the Ecological Society of America, which has devoted much effective labor toward interesting Amer-

ican biologists in the preservation of natural conditions. This society, with its special committee, would doubtless expect to continue actively in the field, even if the administrative and coordinating functions should be largely handed over to another body. The actual relations betwen the two must be left to the future to decide. It is entirely probable that an amicable and satisfactory solution will be reached when the problem presents itself.

In the meantime, this committee proposes to seek the support of various other organizations which may be interested in achieving the same ends. The present writer has undertaken to solicit the cooperation of some of our principal scientific societies, museums, universities and research institutions. Individual letters will doubtless be sent to the officers of many of these organizations in due time. Matters will be greatly expedited, however, if such officers will take the initiative into their own hands and will communicate with the committee as to what assistance they personally, or the organizations which they represent, are prepared to render.

The assistance might be of various sorts. (1) It might take the form of a mere endorsement or pledge of moral support to the Ecological Society's conservation activities. Such an endorsement, particularly if published in one of the scientific journals, would give to these activities a certain degree of publicity, as well as an added importance in the eyes of many persons. Some recent resolutions of the American Association for the Advancement of Science, the American Society of Zoologists and the Botanical Society of America are cases in point.[2] Unfortunately, however, most of our national scientific societies have thus far shown no interest in the conservation of nature. The officers of one leading biological society decided a year ago that the subject was not germane to the purposes of their organization, and a resolution which had been drafted by one of its members was not even brought to a vote.

(2) Some of these societies might well be expected to go much further than voting a mere cut-and-dried endorsement of conservation activities. Why should not occasional papers, lectures or even symposia in this field be regarded as appropriate material for their programs? Many of the data which are made use of in the campaign for the preservation of natural conditions are likewise of high scientific interest. Various results of disturbing the balance of nature might be mentioned in this connection.

(3) Advice would be welcomed as to lines of activity which the committee might profitably undertake. Suggestions as to possible methods of "organizing" the various scientific interests are to be included here.

(4) Financial assistance is needed, even for this committee's present limited activities. The suggestion has been made that some of the scientific societies might be willing to contribute a certain fraction of their annual dues to the Ecological Society for the purpose of supporting its conservation activities. An appeal has already been made to the National Research Council for a grant for this purpose.

As an aid in the promotion of these ends it has been proposed that the various scientific and research organizations so disposed should form some sort of a loose federation or association of "societies interested in the preservation of natural conditions." This would be likely to promote the interchange of ideas, and effectiveness of action, where action seemed called for. The constituent societies would presumably appoint delegates to the meetings of this federation; these delegates being such of their members as have shown the most active interest in conservation matters. Such a federation would naturally have some organic relation to the Ecological Society's committee. Its efforts, at present, might be effective in several directions: publicity and education, endorsement of or opposition to proposed legislation, actual investigations of specific cases in which emergency measures seem to be necessary, and perhaps some others.

The writer would welcome opinions from the officers of these societies as to the desirability of forming such a federation. He would also greatly appreciate any suggestions

[2] SCIENCE, January 7 and January 28, 1921.

or advice regarding the matters covered by the foregoing article, even if these take the form of destructive criticism. It seems to me that here, as in so many other cases, no far-reaching plans should be adopted until we have had a free discusion in which all angles of the subject have been considered. I am therefore hopeful that this communication may call forth replies, either addressed to me personally or published in the columns of SCIENCE.[3]

F. B. SUMNER

SCRIPPS INSTITUTION FOR BIOLOGICAL RESEARCH,
LA JOLLA, CALIFORNIA

THE NATIONAL GEOGRAPHIC SOCIETY COMPLETES ITS GIFTS OF BIG TREES

THE trustees and officers of the National Geographic Society are deeply gratified to announce to members that the society has been continuing its effort, begun in 1916, to preserve the Big Trees of Sequoia National Park.

By a final purchase in April, 1921, of 640 acres of land in Sequoia National Park, these famous trees, oldest and most massive among all living things, the only ones of their kind in the world, have been saved; they will not be cut down and converted into lumber.

Were a monument of human erection to be destroyed, it might be replaced; but had these aborigines of American forests been felled, they would have disappeared forever. The Big Trees could no more be restored than could those other survivals of indigenous American life, the red man and the buffalo, should they become extinct.

Members of the National Geographic Society will recall that, in 1916, Congress had appropriated $50,000 for the purchase of certain private holdings in Sequoia National Park, but the owners declined to sell for less than $70,000. In that emergency the National Geographic Society took the first step toward saving the Big Trees by subscribing the remaining $20,000. Thus 667 acres were purchased. The society's equity in them was conveyed to the government, and this tract became the property, for all time, of the American people.

In 1920, inspired by the first benefaction, three members of the society gave the society sums equivalent to the purchase price of $21,330 necessary to acquire three more tracts, aggregating 609 acres. Thus the original area of Sequoias saved from destruction was almost doubled.

At the request of the donors, this area was presented to the government by the National Geographic Society in June, 1920. This gift was made possible by the generosity of Stephen T. Mather, director of national park service, who personally contributed $13,130; by D. E. Skinner, of Seattle, who contributed $5,000; and by Louis Titus, of Washington, D. C., who contributed $3,200.

There still remained one other important private holding in Sequoia National Park amounting to 640 acres. Through this tract, which is covered by a splendid stand of giant sugar-pine and fir, runs the road to Giant Forest.

To acquire this approach to the unique forest and to eliminate the last of the private holdings in this natural temple, the National Geographic Society and friends of the society, in 1921, contributed $55,000, with which the tract was purchased. On April 20, 1921, it was formally tendered in the name of the society, through Secretary of the Interior Albert B. Fall, to the American people.

This sum of $55,000 includes $10,000 from the tax fund of Tulare County, California, within which the Sequoia National Park is

[3] Those who are desirous of reading fuller discussions of wild life conservation and the preservation of natural conditions are referred to articles by Harper ("Natural History," Vol. XIX., 1919), Van Name (SCIENCE, July 25, 1919), and Sumner (*Scientific Monthly*, March, 1920). Two books by Hornaday are also to be recommended: "Our Vanishing Wild Life" (N. Y., Scribner's, 1913), and "Wild Life Conservation in Theory and Practise" (Yale University Press, 1914). The Ecological Society of America is likewise about to publish a brief résumé of the "Reasons for Preserving Natural Areas," which will doubtless be rather widely distributed.

situated, a practical evidence that the people closest to the park are alive to the importance of our government owning the land.

The contributors and the amounts contributed were:

Research Fund of the National Geographic Society	$ 5,000
W. F. Chandler, Fresno, California	6,000
George F. Eastman, Rochester, New York	15,000
William Kent, Kentfield, California	250
Stephen T. Mather, Director National Park Service	14,000
Charles W. Merrill, Berkeley, California	250
James K. Moffit, San Francisco	500
John Barton Payne, former Secretary of Interior	2,000
Julius Rosenwald, Chicago, Illinois	1,000
Rudolph Spreckels, San Francisco	1,000
Special Tax Levy of Tulare County, California	10,000
	$55,000

Thus the National Geographic Society has conveyed to the United States government a total acreage in Sequoia National Park of 1,916 acres, purchased at a total cost of $96,330.

It should be noted that the gifts were not solicited by the society. The National Geographic Society asks its membership for no contributions of any sort. Its publications and its scientific and educational activities are entirely supported by their dues.

Every member of the society may feel that he had a part in this enduring gift to his country and to posterity, for the funds appropriated directly by the society for the purchase of the Sequoias came from the fraction of the dues of members set aside for such benefactions.

The tender was made in the name of the National Geographic Society because, as the director of the National Park Service, Mr. Mather, put it:

> It is only proper that this gift should come to the government through the National Geographic Society, in view of the keen interest which the society has taken in the purchase of the other private holdings in this park. It was through direct gifts by your society that we were able to save the Giant Forest, which contains the finest stand of *Sequoia Washingtoniana* in the Sierra.

Following the presentation, Albert B. Fall, Secretary of the Interior, wrote to Gilbert Grosvenor, president of the National Geographic Society:

> *Dear Mr. Grosvenor:* It was a very pleasant surprise when you called on me on April 20 and, on behalf of the National Geographic Society, presented the title deeds and other pertinent papers conveying to the United States the so-called Martin tract of 640 acres in the Sequoia National Park, recently purchased at a cost of $55,000 by your Society, through the generosity of its members, in order that this area with its fine stand of trees might be preserved for the American people.
>
> I have already personally expressed to you my sincere thanks and my acceptance of the proffered gift. Your society on several preceding occasions has stepped in at a critical moment and acquired several similar areas in this same park, thereby saving from extermination other wonderful trees that would otherwise have fallen under the axe.
>
> Your society is to be highly commended on its substantial expression of a high public spirit, and on behalf of the United States I again want to express to you, and through you to the contributors, my deepest appreciation of your generous and considerate action.
>
> Respectfully,
>
> Albert B. Fall
>
> Mr. Gilbert Grosvenor,
> President, National Geographic Society,
> Washington, D. C.

To mankind, throughout the ages, trees have been the most human-like, the most companionable, of all inanimate things. Aristotle thought they must have perceptions and passions. An infinitely more scientific generation still is sensible to their mystical power.

More and more will Americans visit Sequoia National Park to gaze upon the majesty of "Nature's forest masterpieces" in their last stand. National Geographic Society members may well be proud that they had a part in preserving for all time these mementos of a past far beyond the records of written history.

MEETING OF THE EXECUTIVE COMMITTEE OF SIGMA XI

THE executive committee of the Sigma XI Society held its annual spring meeting in New York on May 21.

Careful consideration was given to requests for chapters from a considerable number of institutions and arrangements made in individual cases to recommend the granting of certain charters by the Convention to be held next winter. In other cases petitions were laid over without prejudice for further information and future action.

It was reported that the National Research Council had voted to recognize Sigma Xi by appointing the president as an ex-officio member of the executive board.

The invitation from the Royal Canadian Institute to hold the mid-winter convention in Toronto was accepted and the date fixed for Wednesday, December 28. The convention will be held in the afternoon and the dinner in the evening of that day.

The report of the fellowship committee showed sufficient funds already at hand to assure the success of the plan and it was voted to establish one or more Sigma XI fellowships for the year beginning September, 1921. The Ph.D. degree or its equivalent was decided upon as a prerequisite for appointment, and a sub-committee consisting of Professor Edward Ellery (Union College) and Professor F. K. Richtmyer (Cornell University) was appointed with authority to fix the stipend and to recommend appointments as well as the precise terms under which the fellowships will be maintained. In view of the fact that provisions had already been made under direction of the National Research Council for fellowships in physics and chemistry during the next five years it was voted that, at least for next year, Sigma XI will give preference to other sciences in making the awards of its fellowships.

The membership committee recommended certain changes in order to make possible a wider enlistment of the membership in the work of the society. The preliminary plan includes the division of the organization into members and associates, with the recognition of two groups distinguished on a functional basis, viz: chapter members and associates and general members and associates. The chapter functions will remain unchanged, whereas the members and associates in the general group will participate in the advancement of research through the national convention, the fellowship movement, conferences at scientific meetings, Sigma Xi clubs and such other activities as do not infringe on the rights and privileges of the active chapters. It seemed advisable that the general group should have at least one representative on the executive committee, the representation from the active chapters being then four elective members on that committee. This subject will be more definitely formulated for discussion at the coming convention.

Several minor constitutional amendments were discussed and formulated for presentation through the chapters in the customary manner.

HENRY B. WARD,
Secretary

BERKELEY MEETING OF THE PACIFIC DIVISION OF THE AMERICAN ASSOCIATION FOR THE AD-ADVANCEMENT OF SCIENCE

THE fifth annual meeting of the Pacific Division of the American Association for the Advancement of Science will be held from August 4 to 6 at Berkeley, California, in quarters provided by the University of California. Previous meetings in the order named have been held at San Diego, Stanford University, Pasadena and Seattle. The location at Berkeley will insure a large attendance, as many members of the Pacific Division are resident in the San Francisco Bay region.

Fourteen affiliated societies whose announcements follow will participate in the Berkeley meeting.

GENERAL SESSIONS

Features of the general sessions in which the membership of the Pacific Division and affiliated societies will unite are set forth in

the preliminary announcement of the executive committee as follows:

The Research Board of the University of California is arranging a research conference to be held at the luncheon hour on Thursday, August 4. The special topic for discussion will be "A Survey of Research Conditions in Pacific Coast Institutions." The meeting will be open to members of the Pacific Division and of affiliated societies who are particularly interested in the development of research in Pacific coast colleges and universities.

THURSDAY, AUGUST 4, 2:00 P.M., IN WHEELER HALL

Science and the Public Health

Following the plan so successfully introduced at the Pasadena meeting in 1919, and successfully continued at the Seattle meeting in 1920, of attempting some constructive application of scientific knowledge to important problems of the day, there has been arranged for this meeting a symposium on the afternoon of August 4. The subject is that of the relation of science to public health—a subject with which every one is vitally concerned. An analysis of the vote on each of the four so-called "health amendments" upon which the electorate of California was permitted to express its views at the general election last November, is all that is required to enable one to realize the seriousness of the situation and the necessity for a campaign of education. The public should be fully informed as to what the adoption of those amendments would really mean. To assist the public to a realization of the seriousness of this menace to scientific investigation and to the public health, a symposium has been arranged in which the question will be presented from different viewpoints, as follows:

Public health and human welfare: Dr. Ray Lyman Wilbur, president, Leland Stanford Jr. University.

Whose business is the public health? Dr. F. P. Gay, professor of pathology, University of California.

Education in relation to public health and medical practise: Dr. S. J. Holmes, professor of zoology, University of California.

Physical health and mental health: Dr. Philip King Brown, president of the California Tuberculosis Association, San Francisco.

Rural and Industrial Sanitation: Dr. C. A. Kofoid, professor of zoology at the University of California.

Public health and experimental biology: Dr. H. B. Torrey, professor of zoology, University of Oregon.

Immediately following the close of the symposium, a general session of the Pacific Division will be held for the purpose of electing four members of the executive committee.

THURSDAY, AUGUST 4, 8:00 P.M., IN WHEELER HALL

On the evening of August 4, President David P. Barrows, of the University of California, will give an address of welcome to which response will be made by Dr. Barton Warren Evermann, chairman of the executive committee. This will be followed by the address of the retiring president of the Pacific Division, Dr. William E. Ritter, who will speak on "Scientific Idealism." After the address of the president a reception will be held. The public is cordially invited to attend this and all meetings and lectures of the Pacific Division and of the affiliated societies.

A public address will be given on the afternoon of August 5 by Professor Henry Norris Russell, professor of astronomy, Princeton University, on "The properties of matter as illustrated by the stars."

A banquet will be arranged for the evening of August 5 for all members of the Pacific Division and affiliated societies. The cost per plate will not exceed $2.00.

Astronomical Society of the Pacific

Charles S. Cushing, president, First National Bank Building, San Francisco.

D. S. Richardson, secretary-treasurer, 22 Battery St., San Francisco.

Meetings of the Astronomical Society of the Pacific will be held in Room 1, Students' Observatory, University of California, Berkeley,

at 9 o'clock, on Friday morning and 2 o'clock on Friday afternoon, August 5. An excursion to Lick Observatory, Mount Hamilton, is planned for the afternoon and evening of Saturday, August 6. All members of the American Association for the Advancement of Science desiring to make this trip should communicate with Mr. W. F. Meyer, Students' Observatory, University of California.

The American Physical Society

THEODORE LYMAN, president, Harvard University.
D. C. MILLER, secretary, Case School of Applied Science.
E. P. LEWIS, local secretary for the Pacific Coast, University of California.

The American Physical Society will hold a meeting on August 4, from 9:30 A.M. to 12:00.

American Phytopathological Society, Pacific Division

H. S. REED, president, Citrus Experiment Station, Riverside.
S. M. ZELLER, secretary-treasurer, Oregon Experiment Station.

The American Phytopathological Society, Pacific Division, will hold four sessions for the discussion of diseases of the deciduous fruits, semi-tropical fruits, cereals and potato, August 4 to 6.

California Section, American Chemical Society

WILLIAM C. BRAY, chairman, University of California, Berkeley.
LLOYD W. CHAPMAN, secretary-treasurer, 531 Rialto Building, San Francisco.

The affiliated sections of the American Chemical Society will hold a joint meeting on August 5, at 9:00 o'clock.

California Section, The Society of American Foresters

DONALD BRUCE, chairman, University of California, Berkeley.
WILLIAM C. HODGE, secretary-treasurer, 425 Call Building, San Francisco.

The various sections of The Society of American Foresters will hold a joint meeting with the Western Society of Naturalists and The Ecological Society of America.

Cooper Ornithological Club
Northern Division

CURTIS WRIGHT, JR., president, 6436 Benvenue Ave., Oakland, Calif.
MRS. JAMES T. ALLEN, secretary, 37 Mosswood Road, Berkeley.

Southern Division

LOYE HOLMES MILLER, president, State Normal School, Los Angeles.
L. E. WYMAN, secretary, Museum of History, Science and Art, Los Angeles.

The Cooper Ornithological Club will hold a meeting on the evening of August 3 at 8 o'clock in Room 9, Museum of Vertebrate Zoology, University of California.

The Ecological Society of America

STEPHEN A. FORBES, president, University of Illinois, Urbana, Illinois.
A. O. WEESE, secretary-treasurer, Vivarium Building, Champaign, Illinois.

The Ecological Society will hold joint meetings on August 4 and 5 with the Western Society of Naturalists, the Pacific Fisheries Society and The Society of American Foresters.

Pacific Coast Entomological Society

EDWIN C. VAN DYKE, president, University of California, Berkeley.
FRANK E. BLAISDELL, SR., secretary-treasurer, 1520 Lake St., San Francisco.

A program has been arranged for August 6. There will be a dinner on August 4 and a field excursion on August 7.

Pacific Fisheries Society

JOHN N. COBB, president, University of Washington.
GEORGE F. SYKES, secretary, Oregon Agricultural College.

The Pacific Fisheries Society will hold two sessions during the forenoons of August 4 and 5. Papers will be presented dealing with the artificial propagation of fishes, and other subjects pertaining to the conservation of the fisheries.

Pacific Slope Branch, American Association of Economic Entomologists

E. O. Essig, chairman, University of California, Berkeley, Calif.

A. L. Lovett, secretary-treasurer, Oregon Agricultural College, Corvallis, Oregon.

There will be scientific programs on August 4 and 5 and excursions on August 6 and 7. An entomological dinner has been arranged for August 4.

San Francisco Society, Archeological Institute of America

David P. Barrows, president, University of California.

H. R. Fairclough, secretary, Stanford University.

A meeting of the San Francisco Society, Archeological Institute of America, will be held Thursday morning, August 4, at which papers will be read by members and others interested.

Seismological Society of America

Otto Klotz, president, Dominion Astronomical Observatory, Ottawa, Canada.

S. D. Townley, secretary-treasurer, Stanford University, California.

A meeting of the Seismological Society of America will be held, the details of which will be given in the final program.

Southern California Section, American Chemical Society

Stuart J. Bates, president, California Institute of Technology.

H. L. Payne, secretary, 223 West First St., Los Angeles, Calif.

The Southern California Section of the American Chemical Society will join with the other sections of the American Chemical Society in a meeting to be held on Friday morning, August 5.

Western Society of Naturalists

J. Frank Daniel, president, University of California.

Chester Stock, secretary-treasurer, University of California.

The Western Society of Naturalists will meet at the University of California in conjunction with the meetings of the Pacific Division. Sessions for presentation of miscellaneous scientific papers on biology will be held on the mornings of August 4 and 5 and at other times during the progress of the general meetings should there be additional papers to be presented.

SCIENTIFIC EVENTS

JOHN HARPER LONG

The many friends of the late Professor John Harper Long, for thirty-seven years professor of chemistry in Northwestern University, will appreciate the portrayal of the man as a teacher, investigator, public servant and friend, contained in the small volume entitled "John Harper Long,—A Tribute from his Colleagues." It is edited by Dr. Robert H. Gault of Northwestern University, contains a chapter by F. B. Dains, entitled "Student, Teacher and Chemist," one by F. Robert Zeit, "A Colleague at the Medical School," another by Ira Remsen on "Dr. Long as a Member of the Referee Board," and an appreciation of the last ten years of Dr. Long's scientific work by Julius Stieglitz and Paul Nicholas Leech. Dr. Frank Wright reviews Dr. Long's activities in connection with Chicago's gigantic drainage problems and the volume concludes with a comprehensive bibliography of Dr. Long's publications, comprising one hundred and eighteen contributions.

There is thus compassed in seventy pages, tastily arranged, a fitting tribute to a man who did so much for chemistry and education. One outstanding feature of Dr. Long's professional life comes back vividly to the reviewer, a characteristic which indexed well his deep, unselfish interest in his profession, namely, his constant attendance and active, helpful participation in the national and sectional meetings of the American Chemical Society. Even long after his health should have demanded more consideration of self, he gave unstintingly of his time, his counsel and his uplifting ideals, to the organization which had given him its highest honor.

The edition is limited to a thousand and copies may be obtained through Professor

Robert H. Gault, Northwestern University, Evanston, Illinois.

W. LEE LEWIS

THE SCHOOL OF ENGINEERING OF PRINCETON UNIVERSITY

THE trustees of Princeton University have planned to enlarge its school of engineering, giving courses in civil engineering, electrical engineering, mechanical engineering, chemical engineering and mining engineering. These courses will extend over four years, at the end of which time the bachelor's degree will be given. A fifth year will be required for an engineering degree. The plan of the school is one which will not compete with those of engineering schools giving a four-year course, the intention being to make each of the courses mentioned such that the student will secure sufficient engineering training in four years to become an assistant to an engineer, and so be self-supporting, and in addition receive a thorough grounding in physics, chemistry, mathematics, languages, literature, philosophy, economics and sociology to give him a broad outlook on everyday problems. The endeavor will be to make an engineer rather than a specialist. The fifth year is to be devoted primarily to engineering subjects, including certain courses in engineering economics and possibly a limited amount of research. Professor Arthur M. Greene, Jr., of the Rensselaer Polytechnic Institute, has been called to become the dean of the new school and professor of mechanical engineering; he will take up his duties in the fall of 1922. Professor Greene has served as manager and vice-president of the American Society of Mechanical Engineers and at present is chairman of the research committee of the society, a member of the Boiler Code Committee and chairman of its Special Committee on Steam Piping. He is one of the society's representatives on the Engineering Division of the National Research Council and on the Executive Board of the Federated American Engineering Societies.

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

THE Board of Scientific Directors of the Rockefeller Institute for Medical Research announces the following promotions and appointments:

Dr. Frederick L. Gates, hitherto an associate in pathology and bacteriology, has been made an associate member.

Dr. Frederic S. Jones, hitherto an associate in the department of animal pathology, has been made an associate member.

Dr. Goronwy O. Broun, hitherto a fellow in pathology and bacteriology, has been made an assistant.

The following new appointments are announced:

Dr. E. V. Cowdry, associate member in pathology and bacteriology.

Dr. Albert Fischer, assistant in experimental surgery.

Dr. William A. Hagan, assistant in the department of animal pathology.

Dr. Albert B. Hastings, assistant in chemistry.

Dr. Hugh J. Morgan, assistant in medicine.

Mr. David I. Hitchcock, fellow in general physiology.

Mr. James M. Neill, fellow in medicine.

Dr. John Auer, hitherto an associate member in physiology and pharmacology, has accepted a position as professor of pharmacology at St. Louis University.

Dr. Francis G. Blake, hitherto an associate member in medicine, has accepted a position as professor of medicine in Yale University School of Medicine.

Dr. J. Harold Austin, hitherto an associate in medicine, has accepted a position as professor of research medicine at the University of Pennsylvania.

Dr. Glenn E. Cullen, hitherto an associate in chemistry, has accepted a position as associate professor of research medicine at the University of Pennsylvania.

Dr. William C. Stadie, hitherto an associate in medicine, has accepted a position as assistant professor in medicine at Yale University School of Medicine.

Dr. Martha Wollstein, hitherto an associate in pathology and bacteriology, has ac-

cepted a position as pathologist at the Babies Hospital, New York City.

Dr. Israel J. Kligler, hitherto an associate in bacteriology, has accepted an appointment with the Zionist Medical Unit in Palestine.

SCIENTIFIC NOTES AND NEWS

Dr. F. H. Knowlton, of the U. S. Geological Survey, received the honorary degree of doctor of science from Middlebury College, at its recent commencement.

Professor Lawrence J. Henderson, of Harvard University, has been elected a foreign correspondent of the Paris Academy of Medicine.

Dr. H. S. Washington, of the Geophysical Laboratory, Carnegie Institution of Washington, has been elected a foreign honorary member of the Norwegian Academy of Sciences.

Professor Florian Cajori, of the University of California, has been elected fellow of the American Academy of Arts and Sciences.

Dr. A. Smith Woodward, keeper of geology in the British Museum of Natural History, has been elected president of the Linnean Society of London.

Dr. George M. Piersol, who has been professor of anatomy in the University of Pennsylvania for thirty years, is retiring from active service.

Dr. Michael E. Gardner has been appointed chief of the bureau of preventable diseases and director of the bacteriologic laboratory of the United States Public Health Service.

The Albert medal of the Royal Society of Arts for 1921 has been awarded to Professor J. A. Fleming in recognition of his contributions to electrical science and its applications.

Charles F. Rand, chairman of the executive board of Engineering Foundation, has been elected an honorary member of the Iron and Steel Institute of Great Britain. Mr. Rand is honorary secretary of the John Fritz Medal Board of Award in London which recently bestowed the John Fritz Medal for achievement in applied science on Sir Robert Hadfield. On July 8 the mission went to Paris to confer the John Fritz Medal for 1922 upon Eugene Schneider, head of the Creusot Works.

George Otis Smith, director of the United States Geological Survey, sailed for England on July 9 on the *Cedric* to attend the meeting of the organization committee of the International Geological Congress in London on July 20. Professor R. W. Brock, of the University of British Columbia, the chairman of this international committee, is the other representative of the Western Hemisphere. The last meeting of this congress was held in Canada in 1913, when Belgium invited the congress to meet in Brussels in 1916. This invitation has been renewed for 1922.

Dr. William H. Welch, director of the school of hygiene and public health, Johns Hopkins University, is among those who will attend the dedication of the new buildings of the Peking Union Medical College, at Peking, China, in September.

Professor Thomas Hunt Morgan, of Columbia University, is spending the last few months of his sabbatical leave at the University of California, where he and his group of assistants are continuing their genetic investigations of *Drosophila*. The other members of the party are Dr. A. H. Sturtevant, Dr. C. B. Bridges, Dr. D. E. Lancefield, Mrs. D. E. Lancefield and Miss Phoebe Reed, cytologists, and Miss Edith Wallace, artist. The party will remain at the university until the opening of Columbia University about Sept. 15.

Thomas Forsyth Hunt, dean of the college of agriculture at the University of California, has returned to the university after a year's travel and study in Italy, Sicily, Egypt, England and Scotland. The main purpose of his trip was to make a survey of European methods of agriculture with special reference to fruit production and its effect upon the progressive development of various nations.

Dr. O. G. F. Luhn, of Larawok, Borneo, recently arrived at the University of California

Farm at Davis to spend some time in the study of cereal crops and cultural methods in behalf of the British government. Dr. Luhn expects to introduce California methods of culture and of cropping into Borneo when he returns.

CAPTAIN ROALD AMUNDSEN arrived at Seattle on July 4 from Nome, Alaska, where he appeared the middle of June after leaving his schooner, the *Maude*, at Cape Serge disabled by a broken propeller. Captain Amundsen said he still considered entirely feasible his project to drift across the North Pole with the current. He expects to remain in this country a year before proceeding with his voyage.

THE Buffalo Society of Natural Sciences held a radium exhibit at its new museum on June 17 in honor of the visit to Buffalo of Mme. Curie, who was presented with honorary membership in the society. The address on radium was delivered by Dr. Edward J. Moore, professor of physics at the University of Buffalo.

THE Adamson lecture was delivered at the University of Manchester on June 9 by Professor Einstein, who had been invited by the council in accordance with a senate recommendation passed on February 3. At the opening of the proceedings the honorary degree of D.Sc. was conferred on him. Professor Einstein lectured on June 13 at King's College, London, on "The development and present position of the theory of relativity." After the public lecture Professor Einstein was the guest of the principal of King's College at a dinner given in the college.

A BRONZE statue of Joseph Leidy was unveiled in the medical laboratories of the University of Pennsylvania on June 19, 1921. Samuel Murray was the sculptor.

DR. MARSHMAN EDWARD WADSWORTH, dean emeritus of the school of mines of the University of Pittsburgh, has died at the age of seventy-four years.

THE South African Association for the Advancement of Science is meeting at Durban July 11–16, under the presidency of Professor J. E. Duerden, of Rhodes University College, Graham's Town. The sections and presidents are as follows: Astronomy, Mathematics, Physics, Engineering, Dr. J. Lunt, of the Royal Observatory, Cape of Good Hope; Chemistry, Geology, Geography, Dr. J. Moir, chemist to the Mines Department, Johannesburg; Botany, Forestry, Agriculture, Professor J. W. Bews, of Natal University College, Maritzburg; Zoology, Physiology, Hygiene, Professor H. B. Fantham, of University College, Johannesburg; Anthropology, Philology, Dr. C. T. Loram, of the Natal Education Department; Education, Sociology, History, Professor, W. A. Macfadyen, of Transvaal University College, Pretoria.

A STANDING committee has been appointed within the Department of Agriculture by Secretary Wallace to study the present economic situation of agriculture and make recommendations with respect to any action which might be taken by the department to improve conditions. The committee consists of Assistant Secretary Ball, chairman; Dr. H. C. Taylor, chief of the Office of Farm Management and Farm Economics; Dr. W. A. Taylor, chief of the Bureau of Plant Industry; Dr. John R. Mohler, chief of the Bureau of Animal Industry; and Leon M. Estabrook, associate chief of the Bureau of Markets. The members are gathering data from sources in the Department of Agriculture, and agricultural leaders and economists in various parts of the country will be consulted. They are also making a careful survey of the activities of the department in the field of economics with the purpose of coordinating and strengthening this work.

WE learn from *Nature* that at a general meeting of members of the Royal Institution held on June 6 special thanks were given to Sir Humphry Davy Rolleston for his present of a safety-lamp which was in the possession of Dr. John Davy, brother of Sir Humphry Davy, and to Sir David L. Salomons for his present of a privately printed Life and Study of the Works of Breguet, the famous watchmaker, Argo's watch, and two others of spe-

cial interest, the first working aneroid made by Vidi in 1857, and a series of models illustrating the development of the chick.

Baron Edmond de Rothschild, administrator of the Eastern Railway Company of France, has given 10,000,000 francs to found a scientific institute to encourage students to devote their lives to the work of research. The institute will aim to develop science in industry and agriculture. The institute is to be managed by a council, members of which are to be elected by the Academy of Sciences, the College of France, the Faculty of Sciences and the Paris Museum.

The *Journal* of the American Medical Association reports that a new pathological and bacteriological institute has been opened in Prague. There are divisions for pathologic anatomy, experimental pathology, bacteriology and legal medicine. It is popularly called Hlava's Institute, from the name of its chief, Professor Jeroslav Hlava. Dr. Hlava is the senior professor of the staff of the Czech medical school, and is a well known authority on exanthematic fevers. In addition to being president of several medical societies and a corresponding member of the French Academy of Medicine, he is also the president of the Czech Society for Cancer Research. On the day the new building for pathology was opened, the president of the republic made a gift of 100,000 crowns to the Cancer Society for continuing and developing its work.

The importance of regular meteorological reports from Greenland for the forecasting services of Western Europe, and, indeed, for that of Canada also, has, says *Nature*, been recognized for some years. The question of these reports was discussed at the meeting of the International Commission for Weather Telegraphy which was held in London in November last, and the commission decided unanimously that "the establishment at the earliest possible date of a high-power radio-telegraphic station in Greenland is of the utmost importance to the meteorology of Western Europe, and, further, it is of such importance as to warrant the international provision of funds for maintaining it." It is probable that the provision of such a station by the Danish government will be made at an early date. When this station has been provided it will be possible to make a definite use in weather forecasting in Europe of meteorological observations from Canada and the United States. Hitherto the gap between the European and American observations has been so great that meteorologists have been unable to justify the expense which would be involved in regular cable messages from America to England.

The medical division of Stanford University Medical School has received a grant of $300 from the Committee on Scientific Research of the American Medical Association. This money is to be used for the furtherance of an investigation into the factors influencing the rate of urea excretion.

UNIVERSITY AND EDUCATIONAL NEWS

Bequests amounting to $16,624,203 are assured to the medical schools of Harvard, Columbia and Johns Hopkins Universities by the action of Miss Alice A. De Lamar in the Surrogate's Court in waiving her rights to protest the will of her father, Captain Joseph R. De Lamar. The will left more than half of his estate, valued at $33,327,000, to education and charity. The descendant's estate law of New York bars a person from leaving more than half of his estate to charity, without appproval of the heirs.

Dr. G. Canby Robinson, Baltimore, has accepted the post of professor of medicine at the Johns Hopkins Medical School and physician-in-chief of the Johns Hopkins Hospital, to succeed Dr. William S. Thayer. Dr. Robinson is now professor of medicine and dean of the medical faculty of Vanderbilt University, Nashville, Tenn., and expects to return at the end of the year.

Dr. Paul J. Hanzlik, associate professor of pharmacology, school of medicine, Western Reserve University, has been appointed professor of pharmacology in the

school of medicine of Leland Stanford Junior University. Upon his resignation from the medical faculty at Western Reserve, a dinner in honor of Dr. Hanzlik was given at the University Club of Cleveland.

AT Oberlin College, Mr. F. E. Carr has been promoted to an assistant professorship of mathematics, and Dr. C. H. Yeaton, of Milwaukee College of Engineering, has been appointed assistant professor of mathematics.

DR. PAUL THOMAS YOUNG, of the University of Minnesota, has been appointed associate in psychology in the University of Illinois.

HARRY F. LEWIS, A.B., A.M. (Wesleyan), Ph.D. (Illinois), at present with the National Aniline and Chemical Company of Buffalo, has been elected associate professor of chemistry at Cornell College, Mount Vernon, Iowa.

DISCUSSION AND CORRESPONDENCE

AN ANALOGY BETWEEN THE THEORIES OF NATURAL SELECTION AND ELECTROLYSIS

1. IN a recent reading of the "Origin of Species" I was struck by a marked similarity of the theory, to Clausius's views of the nature of electrolysis. In the latter one begins with ions produced by causes quite outside of the electrical forces. Their presence is a phenomenon on a scale of forces totally beyond the compass of the relatively feeble electric field. They are usually an essentially rare occurrence among molecules. The period of existence of each ion, moreover, is relatively short; but their virtues are at once retrieved, I might say inherited, by the progeny of some other molecule, so that the phenomenon is practically continuous. The familiar result is that the presence of an apparently inadequate field gives us a continuous supply of anions and cations at the electrodes.

2. Now replace ionization by variation, also an essentially independent phenomenon. Consider the positive ion a favorable variation and the negative ion an unfavorable variation. Let the electric field be replaced by natural selection, which embodies a sort of tendency or draft of the same nature as a physical field of force. At least, reciprocally with the individual, it amounts to that, as is evidenced by the term "struggle." Physical forces, moreover, are in a similar way doubly specific. Finally, let the cathode be the goal of survival and let the anode denote extinction. Then the two mechanisms would function in the same way.

3. I have drawn inferences from the model; but these are beyond the mark here. It is merely my purpose to indicate that a mechanism which functions so efficiently in the laboratory, can not under a wider interpretation, fail to function in the economy of nature, and that you have in electrolysis an ocular and approachable demonstration of the result. The thing works. Of course the model represents only an infinitesimal element (as it were) in the continuity of Darwinian evolution. Nevertheless given ionization (however rare among millions of molecules) or an available variation; given also an electrical field (however feeble) or natural selection, you can not have stagnation; irremediably you will have to accept development, appreciable within a period commensurate with the two factors.

CARL BARUS

BROWN UNIVERSITY,
PROVIDENCE, R. I.

NATIONAL TEMPERAMENT IN SCIENTIFIC INVESTIGATIONS

TO THE EDITOR OF SCIENCE: In Professor Carmichael's paper on "National temperament in scientific investigations" in SCIENCE for April 1, 1921, occurs the sentence:

> They (the British) have *no university eager to nurse and develop new talent*, so that the new thinker becomes devoted to nature.

In Merz's "European Thought in the Nineteenth Century," in the first volume, part one, "on the growth and the diffusion of the scientific spirit in the first half of the nineteenth century," we find the statement on page 286:

> The rare genius, gifted with the power of original thought, who found no academy ready to call him, no schools where he could be trained, *no university eager to nurse and develop his talent*, did not retire into the depths of his own

consciousness, or surround himself with the artificial atmosphere of erudition. . . . In England the isolation from society and the solitariness of genius threw him into the arms of Nature. . . .

Again on page 276:

But it is a fact that no Academy existed in this country which was zealous in collecting and arranging all the best labours of scattered philosophers, no university which was anxious to attract and train promising intellects. . . .

Most of the phrases in Professor Carmichael's paragraph on British science and also in the paragraph contrasting the temperaments of the three European nations will be found in this chapter of Merz's on pages 250, 252, 279, 281 and 300.

I wish to point out that what Merz wrote in 1896 about English science and English universities in the first half of the nineteenth century does not necessarily apply to British science and British universities at the present time. As Merz remarks on page 300:

During the second half of the century a process of equalisation has gone on which has taken away something of the characteristic peculiarities of earlier times. The great problems of science and life are now everywhere attacked by similar methods. Scientific teaching proceeeds on similar lines, and ideas and discoveries are cosmopolitan property.

Whether or not this is a fact, and whether or not, if it is a fact, the final paragraphs of Professor Carmichael's paper are sound, I do not pretend to judge. But I do protest that the statement that the British have no university eager to nurse and develop new talent is not true to-day, even if it was true in 1850.

It may also be proper to note that Merz's statement definitely applies to *English* rather than to *British* universities; and on page 271 the Scottish universities of that day are contrasted with their English sisters.

J. W. Clawson

To the Editor of Science: The criticisms of my article on "National temperament in scientific investigations," offered by Mr. J. W. Clawson, are essentially the following two: It is implied that I have made an improper use of Merz's "European Thought"; it is claimed that I have been unjust to the British in a certain particular. I appreciate the opportunity to say a word about them.

With respect to the first of these I prefer to leave it to the reader, who makes the comparison between the two paragraphs named by Mr. Clawson and the passages in Merz referred to by him, to determine whether my practise is justifiable, calling his attention to the fact that the statements in one of these paragraphs were given as what seemed to me to be "the impartial verdict of history" rather than as an expression of judgment independently formed by me.

With regard to the question of injustice to the British I have the following to say: The main burden of my paper was to urge upon my own countrymen the desirability of realizing in their own scientific activity the characteristics of spontaneity and individuality which have particularly marked the work of the British and which have led (as it was pointed out) to a greater fruitage of the larger things among them than has fallen to the lot of any other people; in the particular (and somewhat unfortunate) phrase criticized I had no intention to say anything particularly harmful to the British nor had I supposed that I had done so; one of my correspondents has expressed his pleasure in what he was pleased to call my just emphasis of the value and importance of the British methods and results; Mr. Clawson now appears to think that I am quite unjust to the British (at least in a certain particular); another has already belabored me for being unjust to the Germans; if still another shall accuse me of a like injustice to the French, I shall begin to think that I have held a fair balance among the three nations in my attempt to point out certain values realized by them which I wish to see attained by the scientists of America in fuller measure in the future than in the past.

R. D. Carmichael
University of Illinois

SPECIAL ARTICLES

THE PREDICTION OF THE PHYSIOLOGICAL ACTION OF ALCOHOLS[1]

COMPARATIVELY few laws are known connecting the chemistry of various substances with their physiological effects; such a condition is natural because of the complexity of many of the compounds used in therapeutics. In seeking for generalizations it is therefore advisable to direct our attention at first to compounds possessing rather simple structures.

In connection with the testing of the toxicity of various normal primary alcohols upon *Paramecia* the writer noticed the almost quantitative application of a simple numerical rule. Methyl alcohol, as was expected from its structure, exhibited an abnormaiity, but beginning with ethyl alcohol and expressing its action as *unity* the acute toxicities of the successive members subjected themselves to numerical expression, particularly when the quantity of alcohol used was expressed in moles and not in grams.

In an homologous series of this kind the molar toxicity of any given member is three times that of the preceding member. The rule is expressed numerically by the geometrical progression:

$$1 : 3 : 3^2 : 3^3 : 3^4 : 3^5 \ldots .$$

The value of this generalization, originally presented by Traube on the basis of surface tension experiments, lies in the fact that it may be appplied not merely to unicellular organisms, but to mammals as well. Its application is shown best by a few examples.

EXAMPLE I

The toxic concentration of ethyl alcohol for a given strain of paramecia was found by experiment to be 4.5 per cent. What concentration of *n*-octyl alcohol will prove equally toxic to the same strain of organisms?

Solution: $1 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 729.$

$$\frac{4.5\% \times 2.8^{*\,2}}{729} = 0.02\% = \text{calculated concentration.}$$

The observed value was found to be 0.03 per cent.

EXAMPLE II

If a mouse is killed within a few hours by intraperitoneal administration of 12 mg. of ethyl alcohol per gram of body weight, what will be the corresponding toxic dose of *n*-amyl alcohol?

Solution: $1 \times 3 \times 3 \times 3 = 27.$

$$\frac{12 \text{ mg.} \times 1.9^*}{27} = 0.84 \text{ mg.}$$

The observed value was found to be very close to 1.0 mg. per gram of body weight.

EXAMPLE III

The toxic dose of ethyl alcohol when injected into the blood stream of the cat was found by Macht[3] to be 5.0 c.c. per kilo. The administration time was 50 minutes. Under exactly similar experimental conditions what will be the toxic dose (*a*) of *n*-propyl alcohol, (*b*) of *n*-amyl alcohol?

Solution: (*a*) $1 \times 3 = 3.$

$$\frac{5.0 \text{ c.c.} \times 1.3^*}{3} = 2.17 \text{ c.c.}$$

$$= 2.14 \text{ c.c. corrected for sp. gr.}$$

The experimental value was found by Macht to be 2.0 c.c., although in this case the toxic amount of liquid was administered during 20 minutes.

Solution: (*b*) $1 \times 3 \times 3 \times 3 = 27.$

$$\frac{5.0 \times 1.9^*}{27} = 0.35 \text{ c.c. (uncorrected for sp. gr.).}$$

The experimental value was found to be 0.15 c.c., which is a very satisfactory result in view of the fact that the toxic material was administered during seven minutes. When administered over an interval of from 30 to 50 minutes the observed value would no doubt approach the calculated value.

A more detailed discussion of the present work is appearing in a series of reports in the *J. Am. Pharm. Association.*

OLIVER KAMM

[1] Article No. 4, Chemical Research Department, Parke, Davis & Co.

[2] The values marked with the asterisk are molecular weight ratios which serve to convert the predicted values from moles to grams.

[3] *J. Pharmacol.*, 16, 1 (1920).

THE AMERICAN CHEMICAL SOCIETY

DIVISION OF ORGANIC CHEMISTRY

(*Continued*)

Symmetrical tribromphenylpropiolic acid and its reaction with acetic anhydride: Robert Chambers. Phenylpropiolic acid condenses with acetic anhydride to form α phenylnaphthalene dicarboxylic anhydride. This reaction holds for derivatives of phenylpropiolic acid where there is a free ortho hydrogen. It was desired to investigate the action of acetic anhydride on a di ortho substituted phenyl propiolic acid. The above acid was prepared from meta nitro cinnamic acid as follows: reduction with zinc and hydrochloric acid gave meta amido hydrocinnamic acid. Bromination and subsequent diazotization in boiling ethyl alcohol gave 2.4.6 tribromhydrocinnamic acid. Heating to 145° in a sealed tube with bromine gave αα dibrom 2.4.6 tribromhydrocinnamic acid. The latter with hot alcoholic potash gave 2.4.6 tribromphenylpropiolic acid. With acetic anhydride the above acid does not condense to α phenylnaphthalene derivatives but forms an anhydride which may be hydrolyzed to the original acid.

The reactions of alpha anthroquinonesulfonic acids with mercaptans: E. Emmet Reid, Colin M. Mackall and G. E. Miller. Sodium anthroquinone-alpha-monosulfonate and the 1.5 or 1.8 disulfonates react readily with mercaptans in water solution to replace the sulfonic acid group by —SR to give anthraquinone alkyl thio-ethers or dithio-ethers, α-$C_{14}H_7O_2$.SR, 1, 5-$C_{14}H_6O_2(SR)_2$ and 1.8-$C_{14}H_6O_2(SR)_2$. The disulfonates may give the intermediate alkyl thio-ether sulfonate.

The polymers of pinene: G. B. and C. J. Frankforter and E. R. Kryger.

Contribution to our knowledge of the chemistry of calcium carbide: G. B. Frankforter and A. E. Stoppel.

A new lactone from oil of orange: Francis D. Dodge. Essential oils of citrus species, obtained by expression, on standing generally deposit solids from which certain lactones derived from coumarin have been obtained. In the present communication is described a new lactone of rather unusual properties obtained from the sediment of West Indian oil of orange. It forms colorless needles (m. p. 88–90°) easily soluble in alcohol and ether, slightly so in ligroin. Optical rotation is about —38° in alcohol. On acidifying an alkaline solution it yields a crystalline acid (m. p. 151°) from which no crystalline salts could be obtained. It yields no acetyl derivative, and can not be reconverted into the lactone. It is readily oxidized by permanganate. The lactone, like coumarin, yields a crystalline compound with bisulfite. Analysis indicates the empirical formula: $C_{18}H_{18}O_3$.

The bromination of 2-amino-p-cymene: Alvin S. Wheeler and Ira W. Smithey. Pure p-cymene, obtained from spruce turpentine, was nitrated and the 2-nitro-p-cymene was reduced with Sn and HCl. The acetyl derivative of 2-amino-p-cymene in CCl_4 solution was boiled with bromine. Bromo derivative, needles, m. 122°; yield 60 per cent. Hydrolysis gave free amine, liquid, b. 169°–170° at 20 mm., d_4^{21} 1.3012, n_D^{20} 1.5781. HCl salt, plates, m. 206°–210°. HBr salt, plates, m. 205°. Diazobromoaminocymene, canary yellow needles, m. 146°–148° (decomp.). Oxidation of bromoacetylaminocymene with neutral permanganate gave a toluic acid derivative, m. 213°. Hydrolysis with acid gave the bromoamino acid, needles, m. 151°; HCl salt, plates, m. 190° (decomp.). No bromoamino toluic acid of this description could be found in the literature. The Br atom appears to be in the 3 position.

New derivatives of 2, 3, 8-tribromo-5-hydroxy-1, 4-naphthoquinone: Alvin S. Wheeler and T. M. Andrews. Action of NaOH on the tribromoquinone (*A*) gave the 2, 3-dibromo-5, 8-dihydroxy-1, 4-naphthoquinone (*B*), which, reduced with Zn and H_2SO_4, gave 2, 3-dibromo-1, 4, 5, 8-tetrahydroxynaphthalene, greenish needles, m. 164°–166°. Tetracetyl derivative, yellow needles, m. 149°–150°. Acetyl derivative of *B*, yellow prisms, m. 197°. Methyl ether of *A*, yellowish red plates, m. 209°–210°. Ethyl ether of *A*, yellow needles, m. 134°–136°. Aniline derivative of *A* (Br No. 8 replaced), purplish chip-like crystals, m. 235°. *A* is converted by Zn and H_2SO_4 into the trihydroxy derivative, yellowish needles, m. 106°–107°; triacetyl derivative, colorless prisms, m. 220°. Br. No. 8 in *A* is replaced by Cl with HCl and alcohol, golden bronze plates, m. 152°; acetyl derivative, yellow prisms, m. 160°. Ketone reagents on *A* do not give well defined products.

The bromination of 2-amino-p-cymene: Alvin S. Wheeler and I. W. Smithey. (By title.)

The production of furfural by the action of superheated water on aqueous corn cob extract: F. B. LaForge. (By title.)

DIVISION OF AGRICULTURAL AND FOOD CHEMISTRY

C. E. Coates, *chairman.*
T. J. Bryan, *secretary.*

Suggestions for more rapid and exact methods of analyses for the cheese factory: S. K. ROBINSON.

Some problems of the pure food manufacturer: H. A. NOYES. The preserver of fruit and fruit products has two important problems to solve: (1) The obtaining of a high quality and uniform fruit supply each year, and (2) the processing of fruit in such a way that its natural properties are retained. The pure food manufacturer's inability to accomplish these two things up to the present has allowed the artificial flavor and color manufacturer to develop his products and befuddle the taste of the average consumer. The plans and organization of one large concern, to study the production of quality fruits and to apply research methods to its business, were given.

Variations in the Concord grape during ripening: H. A. NOYES, H. T. KING, J. H. MARTSOLF. Variations in the Concord grape during ripening that are of interest to the juice and jam manufacturer were investigated. Results show a gradual increase in sugar content, a decrease in total acids and irregularities in tannin and coloring matter. Weather conditions were an important factor affecting sugar content, warm days and cool nights seeming to be the optimum condition for developing sugar.

The absorption of copper from the soil by potato plants: F. C. COOK. Insoluble copper compounds present in a Bordeaux spray containing an excess of lime and present in Pickering spray containing no excess of lime, also a solution of sulfate of copper, were added to the soil near the roots of potato plants in equal strengths and amounts at various intervals during the growing season. Samples of vines, tubers and soil were taken for analyses at frequent intervals. The leaves of the plants grown in the soil receiving the insoluble copper, *i.e.*, the sprays, held the largest part of the copper, the roots but little and the stems an intermediate amount. The tubers contained but traces of copper. Where the soil was treated with the copper sulfate solution the roots were injured and the normal metabolism of the vines interfered with. The tubers from these vines were small and the vines stunted. In these plants the roots held more copper than the leaves. The soluble copper sulfate added directly to the soil caused injury to the plants while the insoluble copper compounds of the sprays did not. The extra lime of the Bordeaux spray did not reduce the amount of copper absorbed by the plants compared with the results on the Pickering plants. Where the sprays and copper sulfate solution were added to the soil directly practically the same amounts of copper were recovered from the soil samples. Samples of soil from sprayed potato fields showed but minute amounts of copper.

Pickering Bordeaux sprays: F. C. COOK.

Analysis of the Jerusalem artichoke: A. T. SHOHL. The Jerusalem artichoke, *Helianthus tuberosus,* gives the analysis:

	Water	N×6.25	Fat	Carb.	Fiber	Ash
Per cent...	79.0	3.1	.2	16.5	.8	1.1

The wastage by peeling is 31 per cent., the hydrogen ion concentration (colorimetric) pH 5.0. The carbohydrate is inulin, as determined by polariscope and quantitated after inversion by Benedict's solution. Experiments show it is utilized, and not excreted by diabetics. The nitrogen is largely extracted with boiling water. This non-protein fraction represents 71.5 per cent. of total nitrogen. Of the water soluble non-protein nitrogen 26 per cent. is free amino acid nitrogen and 12 per cent. ammonia nitrogen.

Measuring soil toxicity, acidity and basicity: R. H. CARR.

What puts the "pop" in pop corn? R. H. CARR. (Lantern.)

The rate of oxidation of lime-sulfur: C. A. PETERS and A. L. PRINCE. The rate of oxidation of lime-sulfur is largely independent of the concentration and also of the temperature up to about 80°, when the rate is increased in all but the very dilute solutions.

A color test for "remade" milk: OSCAR L. EVENSON.

Effect of aging on lecithin-phosphoric acid determination of egg noodles: R. C. HUMMELL. The results of these experiments indicate that aging does have considerable effect on the lecithin-phosphoric acid determination in egg noodles. By the end of six months this value had decreased to less than two thirds of the original value and in eighteen months had decreased to one half or less than one half of the original amount. Inasmuch as considerable time may elapse from the time at which egg noodles are manufactured until they reach the consumer, it would seem to be quite in

error to judge the egg content by the value obtained in the aforesaid determination.

Peanut by-products: J. B. Reed.

Some factors governing the crystallization of lactose in ice cream: Harper F. Zoller and Owen E. Williams. A curve is presented as a result of experimental evidence which serves to separate those mixes which will produce sandiness from those which will not, and is based upon the relationship existing between the protein-serum solids concentration and the concentration of lactose within the mix. It is erroneous to calculate the concentration of lactose on the water basis since the total water in the mix is not available to the lactose because of the competition of the other solids. The effect of the proteins within the mix is not to repress the crystallization of lactose, but they act oppositely in increasing concentration. Because of its slow rate of crystallization lactose hydrate is subject to much supercooling and oversaturation. Protein has very little effect upon its rate of growth. The solubility of lactose hydrate according to the best of experimental deductions is 11.15 per cent. at 0° C. In an ice cream mix containing 10 per cent. fat, 14 per cent. of cane sugar and 65 per cent. of water, the above value for lactose reduces to about 8.9 per cent. calculated on the water basis.

A rotating thermocouple and cold junction designed for temperature studies in horizontal power ice cream machines: Harper F. Zoller. A sensitive and experimental thermocouple is described and illustrated which has been designed for the purpose of accurately measuring the temperature of the ice cream mix within the freezer when the latter is rotating at full speed. By maintaining an ice-water cold junction affixed to the shaft of the freezer along with the thermocouple junctions the small temperature differences within the freezer can be measured with an accuracy of .02° C. This latter is also made possible by the use of a five junction copper-constantan thermocouple (of fine wire for small temperature lag effect) and a potentiometric setup embracing a galvanometer of low internal resistance with a potentiometer of microvolt capacity. The unique feature of the instrument is the method of conducting the small e.m.f. from the rapidly rotating shaft to the potentiometer without frictional thermoelectric effects. The instrument has been in regular service for a number of months, has given no trouble, and has measured the rapidly fluctuating temperatures within the mix simply and accurately.

Cases of supercooling during the freezing of ice cream mixes: Harper F. Zoller and Owen E. Williams. By the use of the rotating thermocouple we have examined the point of separation of ice in a variety of mixes. The measurements were made in a commercial ice cream machine of the Miller type with a capacity of five gallons. The freezing point lowering of the mix was not in harmony with the calculated value, but showed a high supercooling in the mix even in the presence of the swiftly moving beaters and scrapers. The addition of fine particles of substances to promote the formation of crystal nuclei prevented the supercooling of the mix and consequently the freezing was done in a shorter time, and the product was smoother. Both fat and gelatin seem to reduce supercooling in the average mixes. When sand is added to an ice cream mix containing 10 per cent. fat and 0.5 per cent. of gelatin ice begins to separate at only a slightly higher temperature when the brine is at 10° F. during the freezing process. If the brine is much lower there is a greater difference in the supercooling effect when no sand is present in the above mix. When mixes are frozen which have been made from evaporated milk containing lactose crystal nuclei and they have not been destroyed by pasteurization, or other means, no supercooling occurs. A great deal of importance is attached to the degree of supercooling and its influence upon the texture of the ice cream as it comes from the freezer.

Black discoloration in canned sweet potatoes: Edw. F. Kohman. The black discoloration which occurs in canned sweet potatoes begins in the bottom of the can where there is usually a semi-liquid starch paste which affords close contact with the can. Eventually it may penetrate the entire content of the can. The black formation is due to the combination of iron dissolved from the can with a tannin-like substance in the potatoes. This is localized to a considerable extent just beneath the peel. But as there is also some throughout the potato and especially about the center no change in present methods of peeling would be of advantage. Tannins do not form black compounds with iron unless the latter is in its highest state of oxidation. As air is essential to bring it into this condition, the necessity of tight seams in canned sweet potatoes is emphasized.

Charles L. Parsons,
Secretary